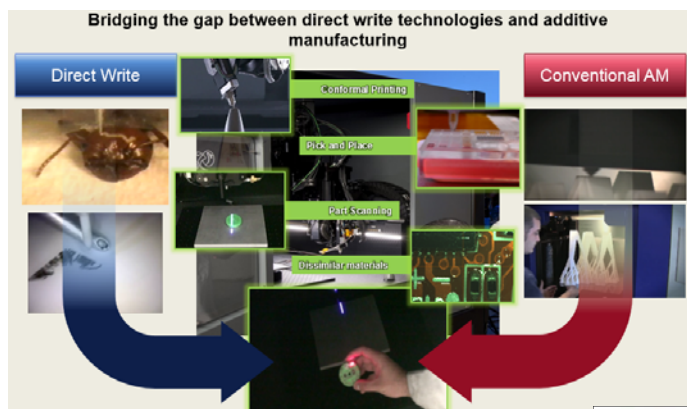



**U.S. ARMY  
RDECOM**
**Additive Manufacturing Research (APG)**
**ARL**
**open  
campus**

**S&T Campaign: Materials Research  
Manufacturing Science**

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## Additive, Direct Write and Hybrid Manufacturing for a 3D ARMY

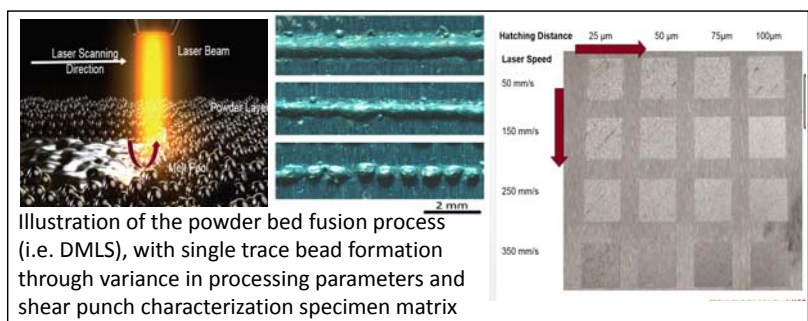
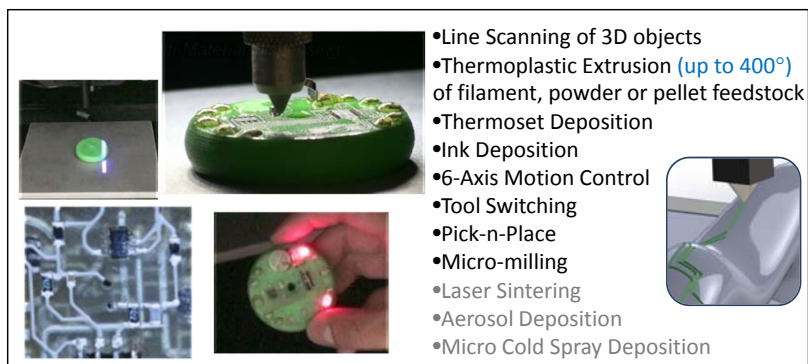
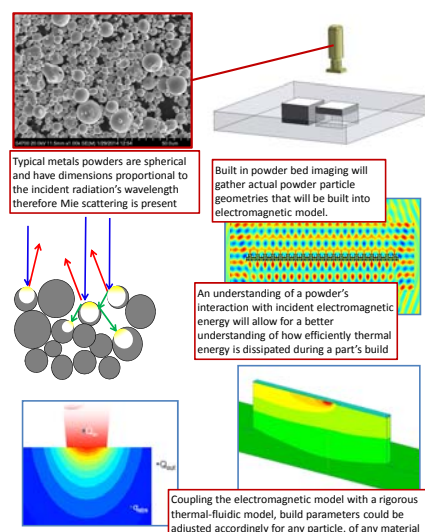
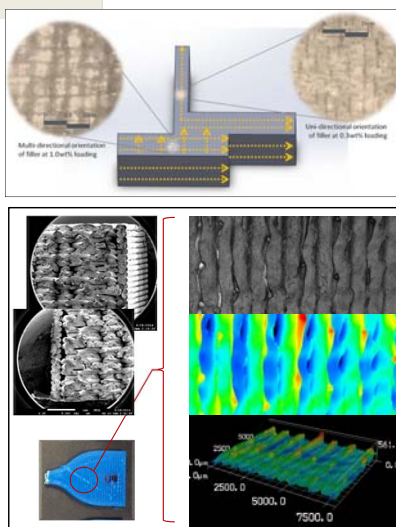


### Research Objective

- Control material-process-property relationship for lightweightening and multifunctionality of critical warfighter components
- Process characterization to feed process modeling that will aid in the prediction of effects of AM
- Apply research to field-ready applications to reduce the Army's logistical burdens

### Unique ARL Facilities

- Full and open access to ALL of the processing parameters for all of the DW and AM equipment in the MiCRO lab
- Feedstock pedigree is 100% verifiable for the AM compliant polymers, metals, and ceramics that are created in-house
- Laser sintering/melting of metals, polymers and ceramics in one platform
- Field-aided vat polymerization for tailored internal structure of 3D composites
- Fiber reinforced thermoplastic micro-extrusion
- Multi-material vat polymerization
- Capillary Cold Spray
- FDM, SL, DLP-SL, SLS, DMLS, LOM



### Challenges

- Many current COTS materials are not applicable to future Army systems
- In-situ characterization is complicated by processing energies and environments required in these manufacturing systems
- Process modeling and simulation is slow to catch up to processing technologies

### Complementary Expertise Sought

- In-situ characterization of matter-energy interaction
- Process modeling for geometric, topological and on-the-fly optimization
- Field-aided processing: electric field, magnetic field, acoustic field, etc.
- Materials and process development: conductive (5+  $\mu$  $\Omega$ /sq), dielectric (50+  $\kappa$ ), exotic, etc.
- Design/development of conformal and awkward passive devices